DYSPHAGIA

Case 1: A 65-year-old male presented with C/O food sticking in throat, off and on aspiration and Halitosis.

Dysphagia – Approach

1. Only solid Dysphagia- Mechanical obstruction.
2. Solid and Liquid Dysphagia- Motility disorder/Neuromuscular disorder

1. Only Solid-
   A. Intermittent- Schatzki Ring
   B. Persistent-
      a. With heartburn – Stricture (reflux/Benign)
      b. Without Heartburn- cancer
2. Solid and liquid-
   A. Intermittent with chest pain – DES
   B. Persistent with heart burn- GERD (Scleroderma)
   C. Persistent with regurgitation - Achalasia

*Scleroderma interferes with secondary peristalsis

Zenkar's diverticulum

- **Due to nonrelaxation of Cricopharynx during swallowing.**
- **Protrusion through killian's dehiscence at hypopharynx**
- **0.5% cancer Risk**
- **Ba Swallow in IOC**
- **TOC –**
  - **A. Diverticulectomy and Cricopharyngomyotomy**
  - **A. Dohlman's Procedure (endoscopic procedure)**

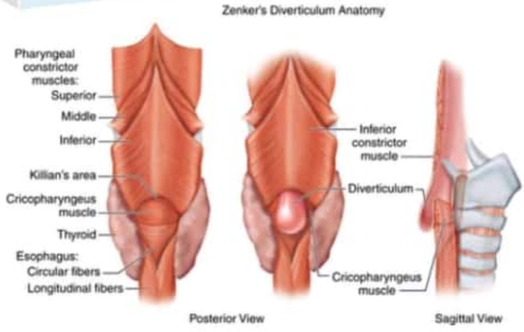
Other T/t:

Botulinum Injection
Diverticulopexy

Diverticulae

Pulsion diverticula
- Increased intraluminal pressure
- Location: Proximal and distal esophagus
- Secondary to motility disturbances such as achalasia
- Example: Zenker's diverticulum (just distal to the pharynx) most common

Traction diverticula
- Extrinsic inflammation retracts or pulls bowel wall outwards
- Location: Mid-esophagus
- Not as common



Esophageal Web

(Plummer Vinson syndrome)

- **Asymmetrical** mucosal web
- Iron deficiency anaemia
- Perimenopausal females
- Post cricoid
- Mild cancer risk
- IOC- Ba swallow
- TOC- Dilatation of web by balloon

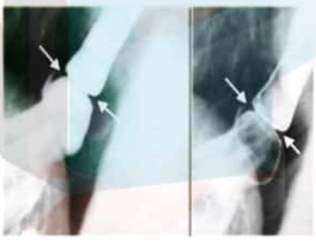
A/K/A: **Paterson-Brown Kelly syndrome**

Plummer Vinson syndrome

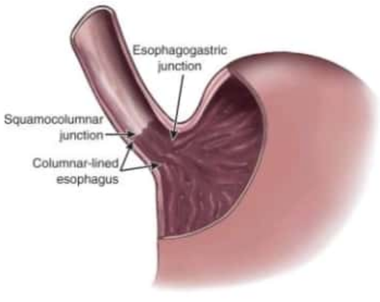
- Iron deficiency anaemia
- Koilonychia
- Glossitis
- Esophageal Web

Schatzki Ring (B Ring)

- **Symmetrical sub mucosal thickening**
- **At Z line**
  - **(Squamo-columnar junction above GE junction)**
- **Found with Sliding hiatus hernia (GERD)**
- **Intermttent dysphagia only for solid (May cause sudden Aphagia)**
- **IOC Ba Swallow**
- **TOC – Balloon dilatation**

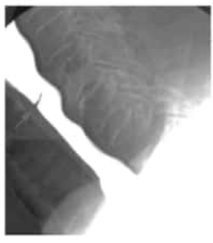


Schatzki B ring at barium swallow.



- Two most Imp D/D of dysphagia in neck are- **Zenker's** diverticulum & **cancer**
- Other rare causes of Dysphagia in neck are Dysphagia lusoria and Plummer Vinson syndrome
- In cases of Cancer, history would be shorter and progressive course, can cause dysphagia anywhere in esophagus. (H/O smoking and alcohol intake generally present and dysphagia starts for solids)

Esophageal web & Ring

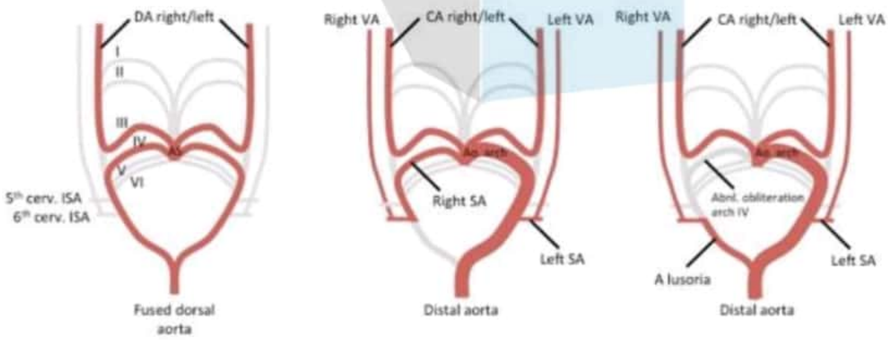


- Dysphagia in mid/ Lower Esophageal area:
- **Most common D/D- Cancer, Motility disorder (Achalasia), Stricture (Benign/Caustic/reflux/Schatzki ring)**

ANATOMY OF ESOPHAGUS

BLOOD SUPPLY	Arterial Supply	Venous Drainage	Lymphatic Drainage
Cervical Part	Inferior Thyroid artery	Brachiocephalic vein	Deep Cervical LN
Thoracic Part	Thoracic Aorta	Azygous Vein	Posterior Mediastinal LNs
Abdominal Part	Left gastric Artery	Left Gastric Vein	Left Gastric LNs

DYSPHAGIA LUSORIA

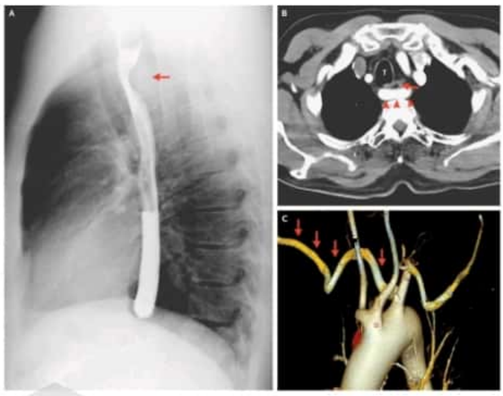


Schematic overview of branchial arch arteries

Normal embryonic development of large arteries

Embryonic development of the a. lusoria configuration

Dysphagia lusoria results from the impingement of the esophagus by an aberrant right subclavian artery (ARSA) coursing posterior to the esophagus.



Case 2: A 25-year-old female presented with progressive dysphagia for last few months which **started with liquids**. Now she is complaining of occasional off and on night time aspiration too.

Achalasia Cardia (Primary Achlasia)

• Characterised by absence of LES relaxation. (Pressure at LES may be Normal to mildly increased, because it is not a disorder of hypertonic LES)
• Caused of absence of **Inhibitory** Myenteric plexus (Auerbach's plexus) at LES *(c.f. In Hirschsprung's Disease where both the levels of plexus are ABSENT)*
• Presents with Dysphagia **(Starts with Liquids)**
• **Triple AAA syndrome (Allgrove syndrome)**- Achalasia, Alacrima (1st symptom), ACTH resistant adrenocortical insufficiency. (Autosomal recessive disorder. Chromosome- 12q13)

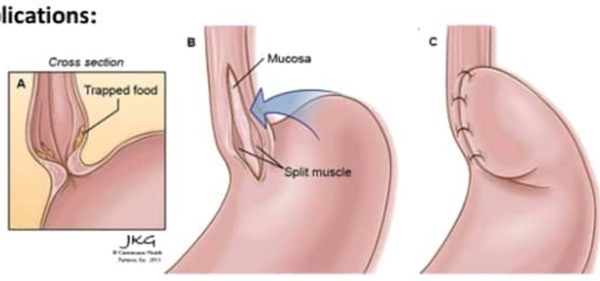
• First Ix- Endosocopy (unless perforation is scared, where then barium is order first)
• IOC- barium swallow- **Bird beak sign (Smooth tapering)** or 'rat tail' sign (though this term is smore used for cancer)
• Gold standard- Manometry

- RAT Tail Sign can also be seen in MALIGNANCY where it is irregular & serrated
- **Pseudoachalasia** (a.k.a. **secondary achalasia**) is an achalasia-pattern dilatation of the esophagus due to the narrowing of the distal esophagus from causes other than primary denervation. One of the most common causes is malignancy (often submucosal gastric cancer) with extension in the lower esophagus.

Treatment of Choice to prevent complications:

Heller's myotomy with
Dor's fundoplication (Anterior 180°)

Nowadays: Via Laparoscopy



Also done nowadays:
POEM: Per-Oral Endoscopic Myotomy

Preferred for CHICAGO type 3

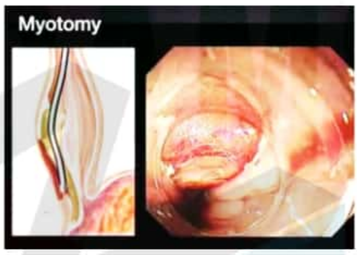


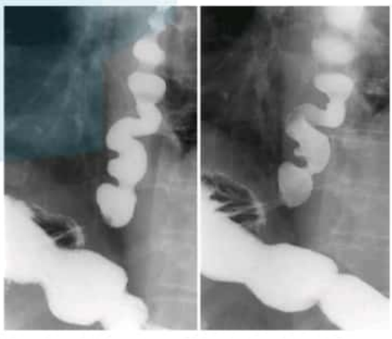
Table 2 Manometric subtypes of achalasia according to Chicago classification

Type I	Absence of peristalsis, no pressurization within the esophageal body, high integrated relaxation pressure
Type II	Absence of peristalsis, and contractile activity, panesophageal pressurization >30 mmHg, and high integrated relaxation pressure
Type III	Absence of peristalsis, and two or more spastic contractions with or without periods of compartmentalized pressurization and a high integrated relaxation pressure

COCK SCREW APPEARANCE on barium swallow.

Seen in: Diffuse Esophageal Spasm (DES)

Due to helicoid pattern of longitudinal muscles of the esophagus.



Case 3: A 62 year old male, chronic smoker presented with progressively increasing dysphagia for last 4 months. Dysphagia is predominantly for solids. He complains of food getting stuck at mid thorax area and he has also observed loss of weight of around 7-8 Kg in last few months.

Probable Dx: Esophageal Cancer

Esophageal cancer

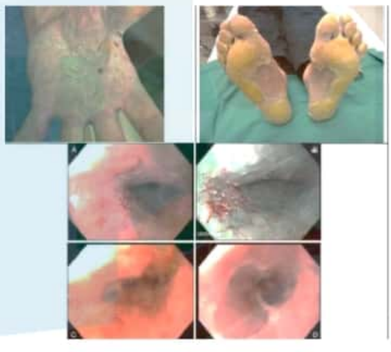
- **Commonest – Middle 1/3rd. SCC (M:F = 3: 1)**
- **In white Males- Lower and Adenocarcinoma (M:F = 10: 1)**
- **Strongest association for : SCC = Tylosis / Adenocarcinoma= Barrets**
- **Screening- Chromoendoscopy (Methylene blue used for Columnar and Iodine for Squamous cell)**
- **First Inv- Endoscopy and biopsy**
- **If complete/severe dysphagia then Ba swallow is done first before endosocpy**
- **For staging- PET CT**
- **For T/ N stage (Locoregional stage)- EUS**
- **For Metastasis- 18 FDG PET scan**

*If PET not available then CECT

TYLOSIS

- Tylosis is also known as Howel Evans syndrome.
- focal non-Epidermolytic Palmoplantar keratoderma (NEPPK)
- AD condition.
- Chromosome form this condition is 17q25 and gene is RHBDF2
- It is characterised by high risk of SCC in esophagus.

Dx: Methylene Blue Chromo-Endoscopy



Treatment:

All squamous cell cancers are radio/chemo sensitive.

Cervical Esophageal cancers can be treated with radio or chemotherapy.

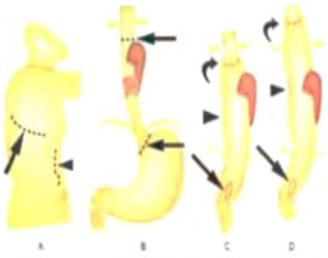
Thoracic and Abdominal Esophageal cancers have to be operated because it is close to lung, heart and vertebras, so no chemo/radio.

Surgeries for Carcinoma esophagus

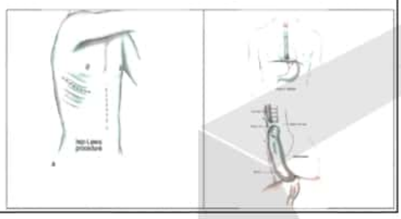
1. **Ivor Lewis esophagectomy (Best for mid or lower esophagus)-**
2. **McKeown Esophagectomy-**
3. **Orringer- (Trans-hiatal esophagectomy)-**
4. **Best Palliative treatment is- Self Expanding Stents (Coated SEMS)**

Esophageal cancer surgery

- Ivor lewis esophagectomy
- For lower/ middle esophageal cancer
- First laparotomy then Rt thoracotomy
- Margin taken-
  - 10cm (esophagus); 5cm (Stomach)
- Gastric pull up

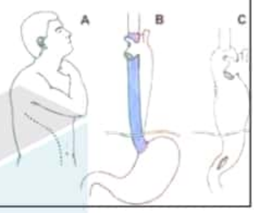


Ivor Lewis esophagectomy



Esophageal cancer surgery: Mckeown: esophagectomy

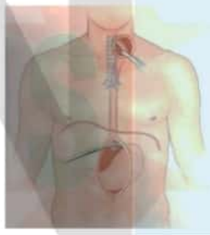
- Mckeown:
- Total esophagectomy
- Preferred for upper esophageal cancer
- Three incisions
  - Laparotomy
  - Right Thoracotomy
  - Neck



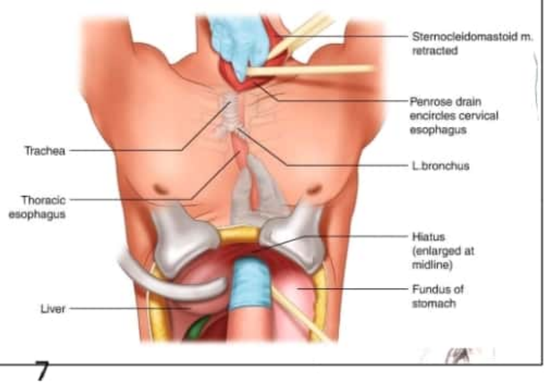
Esophageal cancer surgery: Orringer esophagectomy

- Orringer: Transhiatal Esophagectomy
- First laparotomy then neck incision
- Total esophagectomy

- Stomach flap is based on-
- Right Gastroepiploic > Right Gastric artery



ORRINGER'S ESOPHAGECTOMY



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HEMATEMESIS

Case: A 35-year-old male presented two episodes of hematemesis. He gives H/O upper abdominal pain for last 4 months. He used to get awakened at early morning due to moderate pain which was relieved by food.

HEMATEMESIS:

- Causes: Peptic ulcer (Most common cause) > Gastric erosion
- Children: Portal HT (M/C cause- EHPVO)
- Most common cause of mortality due to upper GI bleed- Portal HTN
- Rare causes: Mallory Weiss syndrome/ Watermelon stomach/ Dieulafoy lesion
- **IOC: Endoscopy**

Criterias for HEMATEMESIS

1: **Bleed risk criteria** has five predictors represented by the acronym "BLEED":

- on-going **b**leeding, **l**ow blood pressure, **e**levated prothrombin time (PT), **e**rratic mental status, and unstable co-morbid **d**isease.

2: **Blatchford score includes**: done before endoscopy

- Hemoglobin level, Systolic blood pressure, Pulse, Blood urea nitrogen level, No melena or syncope, No past or present liver disease or heart failure

3: **Forrest**: On endoscopic findings

4: Rockall score has following criteria: Done after endoscopy

- Age, Blood pressure fall (shock), Co-morbidity, Diagnosis and Evidence of bleeding.

FORREST CLASSIFICATION

Forrest score	*Endoscopic appearance*	*Risk of rebleeding*[a]
Ia	Ulcer with active pulsating bleeding	55%
Ib	Ulcer with active nonpulsating bleeding	
IIa	Ulcer with a visible nonbleeding vessel	43%
IIb	Ulcer with an adherent clot	22%
IIc	Ulcer with hematin on ulcer base	10%
III	Ulcer with a clean base without signs of recent bleeding	5%

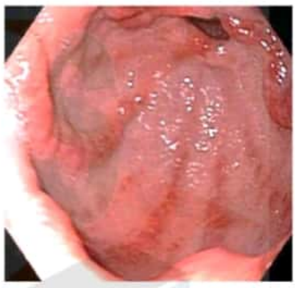
[a]Risk of rebleeding if endoscopic therapy is not performed.
Source: Adapted from Laine, L.; Peterson, W. L. Bleeding Peptic Ulcer. *N. Engl. J. Med.* **1994**, *331*, 717–727.

- Blood transfusions generally is indicated with Hemoglobin level of 7 gm% or less.
- Early upper endoscopy (within 24 hours of presentation) is recommended in most patients with upper gastrointestinal bleeding.
- Patients with low-risk peptic ulcer bleeding having clean ulcer base (Forrest 3) on endoscopic criteria can be discharged on the same day as endoscopy.

• Patients with Forrest type 1 & 2 should remain hospitalized for at least 72 hours.
• All patients with significant upper gastrointestinal bleeding should be started on intravenous proton pump inhibitor therapy until the cause of bleeding has been confirmed with endoscopy.

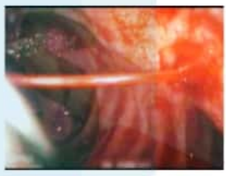
Water Melon stomach
GAVE- Gastric antral vascular ectasia

- Old female
- Degenerative condition
- Associated with-
  - CLD, CRD and collagen vascular disease
- Longitudinal tortuous vessels in antrum
- Off and on bleeding
- TOC: Conservative
  - RFA ablation (HALO 90)/ Argon plasma ablation
  - Antrectomy



Dieulafoy lesion

- Developmental AV malformation
- Submucosal vessel
- Within 6 cm from GE junction at right cardia
- Intermittent profuse bleeding
- Endoscopic coagulation is main treatment



THIS IS THE ONLY CAUSE WHICH IS SUBMUCOSAL (REST ALL ARE MUCOSAL)

Mallory Weiss tear

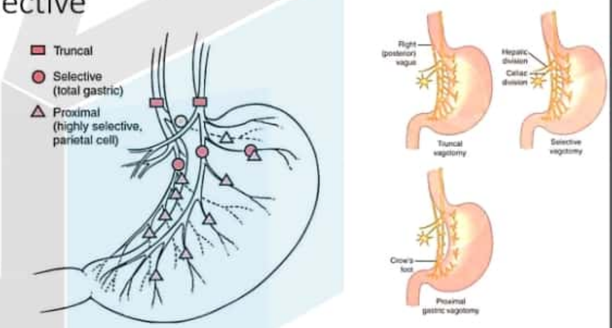
- A longitudinal tear below GE junction on right side, mucosa deep (Muscle remain intact) caused by retching/ vomiting.
- Common during pregnancy, alcoholic binges and hiatus hernia
- Presents with painless mild/ moderate bleed due to left gastric artery
- In most of the cases of bleeding stops spontaneously.
- Patient with persistent bleeding are treated by sclerotherapy
- Blood transfusion is preferred when Hb is < 8 gm%

Gastric and duodenal ulcer - differences

	DU	GU
Cause	High acid production	Low mucosal resistance
H. Pylori association	80-90%	60%
Pain	Relieved by meals/ hunger pains	Aggravated by meals
Complications:	Bleeding > perforation	Perforation > bleeding
Bleeding Artery	Gastro-duodenal artery	Left gastric artery
Cancer risk	Very low	low
Surgery	Vagotomy and drainage	Gastrectomy

- **TRUNCAL:** Cutting of Vagus before it gives any branch.
  - BEST acid control.
  - All branches are denervated:
    - GB Motility lost → GB Stone
    - Celiac Branch gone→Post Vagotomy Diarrhoea
    - Nerve of Latarjet gone: Gastric Outlet Obstruction
  - Therefore has to be accompanied with drainage.

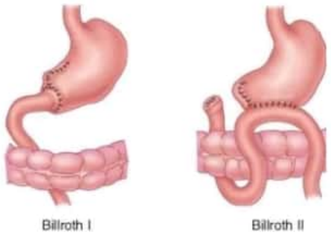
Vagotomy types: Truncal/ selective/ highly selective



- **SELECTIVE:** Cutting the vagi, but the hepatic and celiac branches. But still pyloric branch is lost, so drainage is required.
- **HIGHLY SELECTIVE:** Cutting Only the PARIETAL cell branches. Least Side effects. No drainage is required.

TYPES OF GASTRECTOMIES

A **Billroth I** is the creation of an anastomosis between the duodenum and the gastric remnant gastroduodenostomy). Pref for ***Gastric Ulcer***
A **Billroth II** operation is constructed by sewing a loop of jejunum to the gastric remnant (gastrojejunostomy). Pref for ***Gastric Cancer.***



Billroth II (Ante-colic GJ) & Polya (Retro-colic GJ)

Billroth II 1885

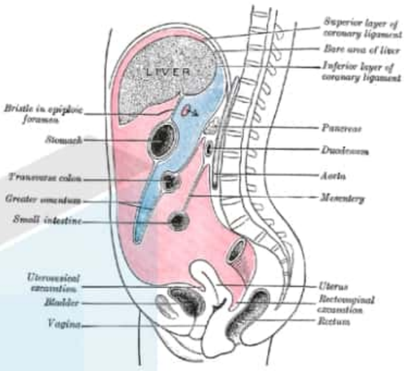
Polya 1911 (retrocolic)

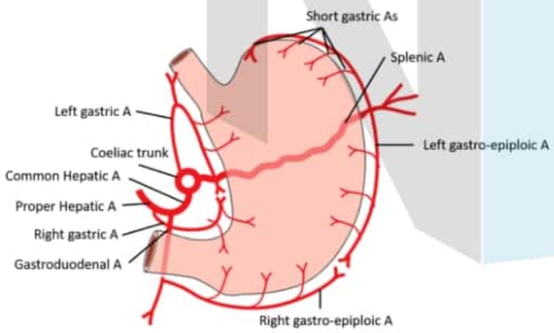
Polya is preferred for Gastric Ulcer

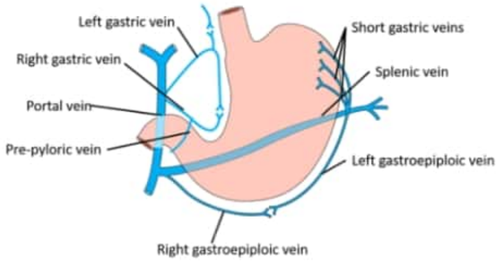
Billroth II is preferred for Gastric Cancer.

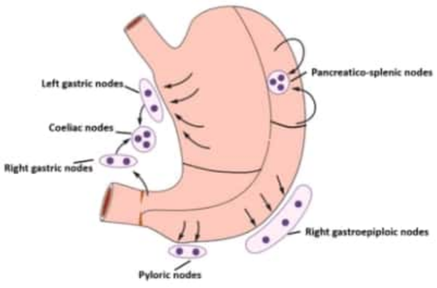
Complications of ulcer:

1. A ulcer situated on anterior surface of duodenum or stomach, perforates in greater sac and presents with perforation peritonitis
2. Posterior gastric ulcer perforates in lesser sac and again presents with peritonitis (Lesser and greater sac communicates with foremen of Winslow)
3. Posterior duodenal ulcer presents with Bleeding due to Gastroduodenal artery
4. An ulcer situated at lesser curvature near cardia of the stomach (Johnson's type IV) may present with bleeding due to Left gastric artery









PHARMACOLOGY - ACID SUPPRESSING DRUGS

A. Proton Pump Inhibitors (PPI)

- H+K+ ATPase irreversible inhibitors (hence long-lasting) but has short half-life in plasma
- This is k/a **Hit and Run Phenomenon** (other drug for this phenomenon- ASPIRIN)
- Reduce **Basal** as well as **Peak** Acid Output
- DOC for all type of PUD
- Given 30-45 mins before breakfast by oral route
- For faster action, IV route is recommended.
- Twice daily dose is recommended to have more efficient action.
- Minimum duration of treatment is 3-4 days (4-5 days for PUD) for complete suppression of acid.
- Enteric Coating is done to protect drug from acidic media. Coating dissolves in intestine.
- Drugs are given in inactive form; they get activated after reaching the parietal cell of the stomach.
- RABEPRAZOLE is the fastest to get activated, PANTAPRAZOLE is slowest
- Not proved to be safe in pregnant females and children. LANZOPRAZOLE and OMEPRAZOLE can be tried (animal studies)
- Require CYP2C19 enzyme in liver for metabolism (except- PANTAPRAZOLE)
- Interact with Clopidogrel- same enzyme of metabolism- Clopidogrel metabolism is slowed causing INCREASED RISK OF MI
- Drug Interaction with -AZOLES (ITRACONAZOLE) & HIV Drugs (Protease Inhibitors), RILPIVIRINE because all these drugs require acidic media for absorption causing Therapeutic Failure.
- Imp S/E- Deficiency of Fe (IDA) , Ca (OSTEOPOROSIS) , Mg (Cardiac Conduction Abnormality) , Vit B12
- Side Effects:
  - Pseudomembranous Colitis
  - Microscopic Colitis
  - LRTI (Pneumonia) – D/t Risk of Aspiration
  - Dementia
  - Interstitial Nephritis
  - Atrophic Gastritis
  - Drug Induced Lupus
  - ?? COVID-19

B. H2 RECEPTOR ANTAGONIST (H2RA)

- Reversible inhibitors of receptors
- Decrease only Basal acid output
- Absorption decreased with antacids, not with food.
- Found safe to use in pregnancy & children
- The dose is generally reduced by 50% in patients with severe renal failure.

- Cimetidine is outdated due to gynaecomastia & CNS side effects.
- Rantidine is taken out of market due to presence of carcinogenic agent Nitrosodimethylamine.
- FOMOTIDINE is used these days and is the most potent H2RA
- Cardiac conduction problems can occur with the rapid infusion of an H2RA
- NIZATIDINE oral bioavailability is about 100%

Other Acid suppressing drugs:

- **M1 Receptor Blocker:** Pirenzapine, Telenzapine
- **PGE1 analogue:** MISOPROSTOL
  - Can lead to abdominal pain and vomiting
  - TERATOGENIC- causes MOBIUS Syndrome

ANTACIDS:

- Al(OH)3 +Mg(OH)2 combination & Megaldrate
- Fastest acting drug in PUD
- Safest to use in pregnancy and children
- Action is short lasting

ULCER PROTECTING DRUGS

- Sucralfate and Colloidal bismuth subcitrate
- Forms protective layer over ulcer
- Bismuth can cause blackening of tongue

H PYLORI TREATMENT

Indications

- Low grade gastric MALT Lymphoma
- Active PUD or past history of peptic ulcer if cure of H. Pylori infection has not been documented.
- Early Gastric cancer

Treatment Regimens for H. Pylori

- The choice of initial regimen guided by the presence of risk factors of macrolide resistance and presence of a penicillin allergy.
- Risk Factors for macrolide resistance include:
  - Prior exposure to macrolide therapy for any reason
  - High local clarithromycin resistance rates ≥15% or eradication rate with clarithromycin based triple therapy ≤85%

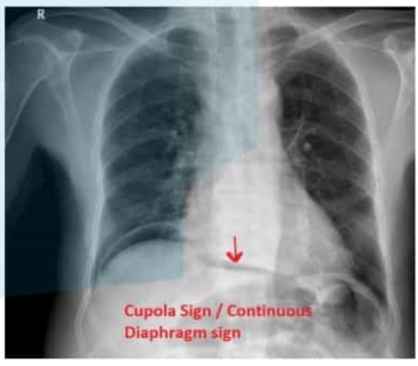
- In patients without risk factors for macrolide resistance, triple therapy with a PPI, amoxicillin and clarithromycin(CAP) for 14 days is recommended.
- Substitution of amoxicillin with metronidazole only in penicillin-allergic individuals since metronidazole resistance is common and can reduce the efficacy of treatment

- In patients with risk factors for macrolide resistance, quadruple therapy is recommended.
- It consists of a PPI(omeprazole), bismuth subsalicylate, metronidazole & tetracycline (TOMB) given four times daily for 14 days
- Other drugs for H. Pylori are:
  - Levofloxacin -Rifabutin
  - Nitazoxanide -Doxycyline

New Regimen- LOAD: LFX, Omeprazole, Amoxicillin, Doxycycline

Plain X Ray signs of pneumoperitoneum

- Air under diaphragm (Best seen on erect Chest XR- IOC)
- Doge's Cap Sign (free Air in Morrison's Pouch)
- Rigler's sign on supine AXR (also known as double-wall or bas-relief
- Falciform Ligament Sign (Silver sign)
- The 'football' sign
- Cupola sign. Air accumulation beneath the central tendon of the diaphragm
- The Inverted V sign



Left Decubitus Abdomen Sign: Best abdominal XRay to show free air in abdomen

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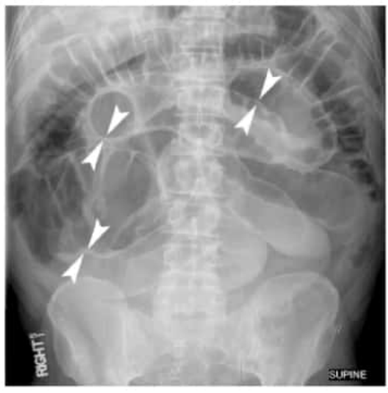
Rigler's Sign: Both sides of the bowel are outlined indicating presence of air on both in and out of the bowel.

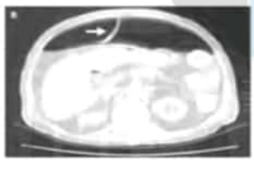
Rigler's triad is a combination of findings on an abdominal radiograph of people with **gallstone ileus**, a condition where a large gallstone causes bowel obstruction. Rigler's triad consists of: (1) small bowel obstruction, (2) a gallstone outside the gallbladder, and (3) air in the bile ducts.



Doge Cap Sign:
Triangular Air shadow in Morrison pouch

Inverted V sign
Children: Umbilical arteries
Adults: Inf Epigastric arteries

Falciform ligament sign (Silver sign)



Chilaiditi syndrome:
Pseudopneumoperitonuem

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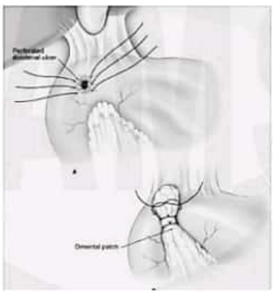
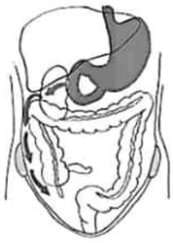
Surgery for duodenal perforation
Graham's omental patch repair



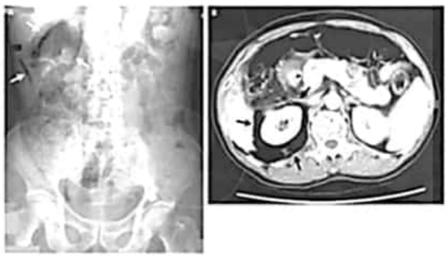
For posterior duodenal perforation-
sclerotherapy (Epinephrine inj)

Two rare complications of posterior duodenal perforation:

Valentino syndrome: is pain in the RIF (mimicking appendicitis) caused by posterior duodenal ulcer perforation.

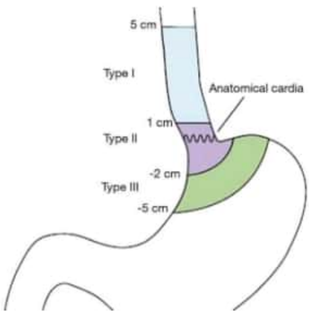


Renal Veil sign: Air around right kidney



GASTRIC CANCER

- Most common site –
  - Proximal Gastric cancer> Fundus
  - India- Antrum
- For GEJ cancer classification-
  - Siewert classification (13 cm length)



Two cutaneous syndromes of Gastric cancer-

Leser-Trelat Sign : Multiple pruritic seborrheic keratoses

- Tripe palms: thickened and velvety palms associated with Scaling and thickening. Tripe palms are frequently seen along with acanthosis nigricans.

Radical gastrectomy

- For Distal gastric cancer-
  - Sub-total Gastrectomy (Billroth II) with 5 cm margin (but for diffuse variety- 8 cm margin is preferred)
- For proximal gastric cancer
  - Total gastrectomy (Roux en Y esophago-Jejunostomy)
- D2 Gastrectomy
  - Number on nodes- >15
  - Level – 3 (till celiac trunk)
  - Japanese station - 11

Stomach cancer

- Monoclonal antibody approved-
- 1- Trastuzumab – for HER2 Neu positive
- 2- Ramucirumab- For VEG F positive tumours
- 3- Pembrolizumab-
  - For PD- L1 positive GEJ recurrent cancer.
  - Who have received 2 CT +/- Herceptin (Trastuzumab)

Stomach cancer

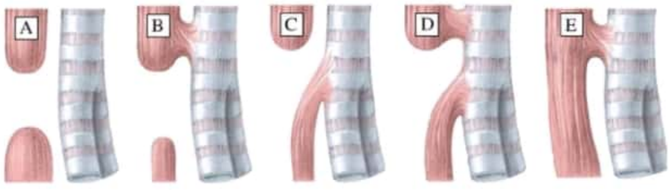
- S 1 chemotherapy:
- Approved for advanced gastric cancer
- Oral Fluoropyrimidine derivative
- Combination of
  - Tegafur (5 FU prodrug)
  - Gimeracil
  - Oteracil

PEDIATRIC GI CONDITIONS

Case 1: A new born child is having continuous dribbling of saliva and is not able to swallow milk. Whenever child is fed he develops chocking and aspiration.

D/D: **TEF** & Neuromuscular disorders

TRACHEO-ESOPHAGEAL FISTULA



- M/C: Type C
- Type A & B have Gasless abdomen
- First test: NGT and XRAY (Tube stops at 10cm from incisor)
- H Type: Most accurate investigation is TRACHEOBRONCHOSCOPY
- Safest Contrast: IOHEXOL

Treatment of Choice:

- for fit child- Right posterolateral thoracotomy and ligation of fistula with esophageal anastomosis.
- For low birth weight child + pneumonia: Feeding Gastrostomy and delayed repair
- For type A (Pure atresia with wide gap) Foker operation is done

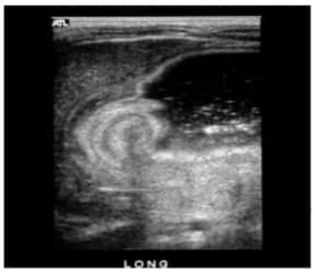
Case 2: A 4 weeks old child presented with non bilious projectile vomiting within minutes after feeding. He appears lethargic and dehydrated. O/E an olive shaped lump is palpable in epigastrium.

Dx: Congenital hypertrophic pyloric stenosis (CHPS)

Stomach- CHPS

- M > F (first born males)
- Projectile non bilious vomiting. 3-8 weeks (4-6 weeks)
- Olive shaped lump in epigastrium
- Left to right peristalsis
- No PEM feature
- No polyhydroamnios
- IOC- USG

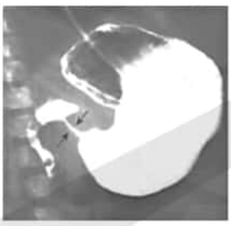
- USG of pylorous, Length- > 16 mm, Thickness > 4mm
- USG
  - Target Sign
  - Antral Nipple sign
  - Cervix Sign



TARGET SIGN

Ba Meal

- String Sign & Mushroom Sign
- Double track sign
- Caterpillar sign

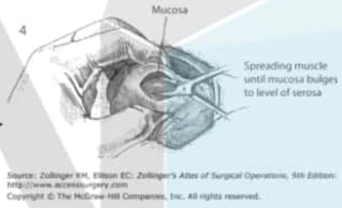


- Electrolyte abnormality:
- Hypocholremic, hypokalemic metabolic alkalosis with Paradoxical aciduria

- Resuscitation fluid
  - N/2 saline: (0.45% NS) + KCL + 5% Dextrose or
  - RL

Surgery

- Done when U.O > 1 ml/kg/hr & Bicarb < 30m Meq/L



Source: Zollinger RM, Ellison EC: Zollinger's Atlas of Surgical Operations, 9th Edition: http://www.accessmysurgery.com
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- Ramstedt Pyloromyotomy- TOC

(Medical treatment: Atropine/ Balloon dilatation)

DUODENAL ATRESIA

Case: A child presented with bilious vomiting few hours after birth. During antenatal investigation, the mother was reported to have polyhydramnios.

Dx. Duodenal Atresia > Annular Pancreas *(Annular Pancreas has non bilious vomiting)*

Duodenal atresia

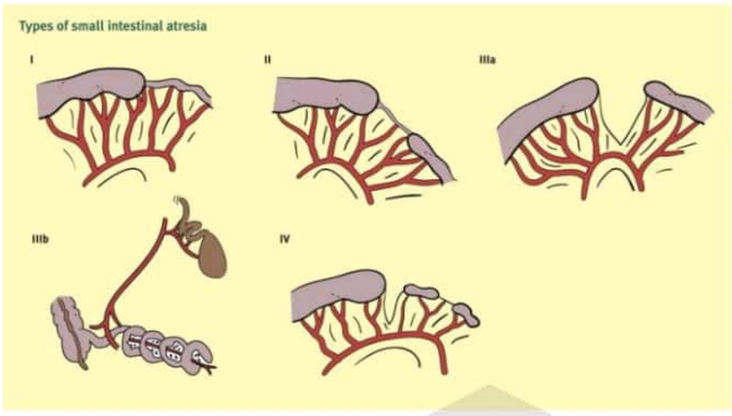
Congenital obstruction of the duodenum by a membrane or a gap between the two ends of bowel (duodenal atresia).

The site of obstruction is distal to the ampulla of Vater so vomiting is of bile-stained (within few hours of birth).

Its common with *Down's syndrome*(25-33%) an polyhydroamnios (50%)

X-Ray – Double bubble sign

TOC – Diamond shape duodenoduodensotmy



Type 1- Wind Sock Deformity

Type 3B- Apple peel appearance (Congenital Midgut Atresia)

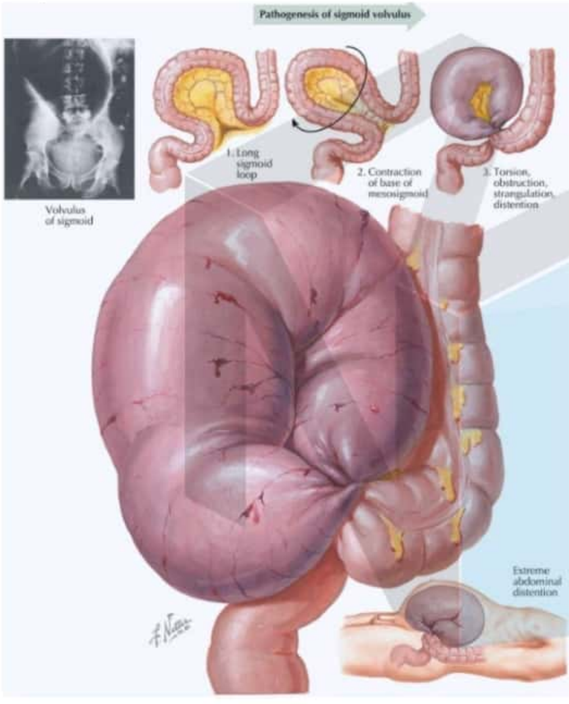
MIDGUT VOLVULUS

Case: A Neonate presented with excessive crying, abdominal distention, bilious vomiting and dehydration. Barium meal follow through picture is given below.

- Due to malrotation
- Presents by 1 year

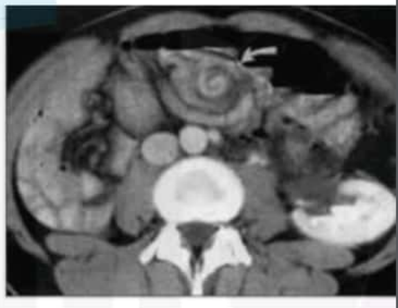
Malrotation of Intestine

- The incidence of malrotation is roughly- 1 in 500 live births.
- Slight male predilection (M: F; 1.3:1)
- 50-75% discovered in the 1st month of life; 90% diagnosed at age < 1 year.
- Many remain asymptomatic well into adult life.

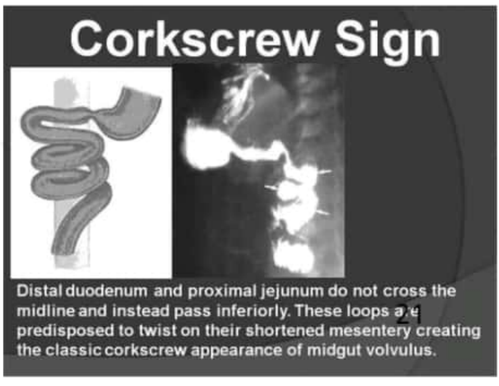

Pathogenesis of sigmoid volvulus
Volvulus of sigmoid
1. Long sigmoid loop
2. Contraction of base of mesosigmoid
3. Torsion, obstruction, strangulation, distention
Extreme abdominal distention

IOC: Barium Meal Follow Through

Corkscrew appearance

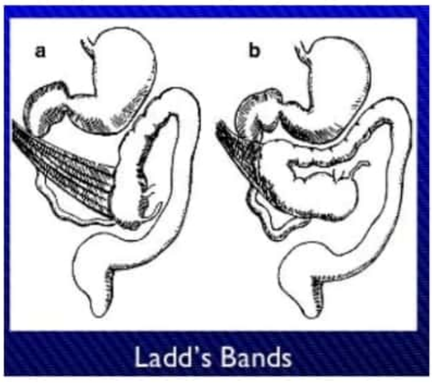


Whirlpool appearance



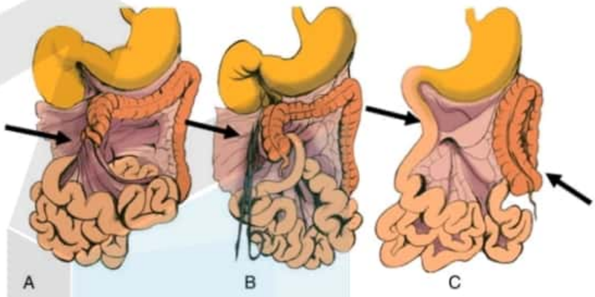
Distal duodenum and proximal jejunum do not cross the midline and instead pass inferiorly. These loops are predisposed to twist on their shortened mesentery creating the classic corkscrew appearance of midgut volvulus.

Non-rotation:



Ladd's Bands

Ladd's bands are fibrous stalks of peritoneal tissue that attach the cecum to the retroperitoneum in the right lower quadrant (RLQ). Obstructing Ladd's Bands are associated with malrotation of the intestine, a developmental disorder in which the cecum is found in the right upper quadrant (RUQ), instead of its normal anatomical position in the RLQ. Ladd's bands then pass over the second part of the duodenum, causing extrinsic compression and obstruction. This clinically manifests as poor feeding and bilious vomiting in neonates. The most severe complication of malrotation is midgut volvulus, in which the mesenteric base twists around the superior mesenteric artery, compromising intestinal perfusion, leading to bowel necrosis.



Ladd's operation

1. Division of Ladd's Band
2. Widening of mesentery
3. Appendicectomy (prophylactically)

Intestinal Obstruction

Case: A new born did not pass meconium after birth. USG and X ray showed intraabdominal calcifications (Picture given).

X ray: Intra-abdominal calcification
USG: Calcification over surface of liver

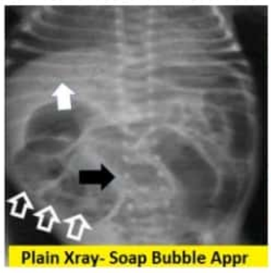
Differential Diagnosis:

A) Meconium Ileus

- Associated with cystic fibrosis (AR)
- Thick meconium ("Glue like Meconium") gets inspissated in bowel causing perforation (Peritoneal calcifications in Meconium peritonitis- Aseptic peritonitis), Strictures, Pseudocyst and microcolon

Barium Enema- Microcolon

• Barium study may show microcolon and soap bubble appearance (**Neuhauser sign**)


Plain Xray- Soap Bubble Appr

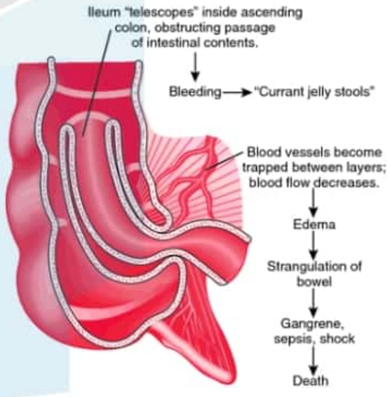
• Gastrograffin enema (two attempts) then **Bishop-Koop operation** (distal ileostomy and proximal to distal anastomosis) is the Treatment of Choice

Bishop-Koop

GASTROGRAFFIN is a high osmolar dye and therefore pulls the water towards the gut lumen and helps to dislodge the mucus plug. Henceforth being both diagnostic and therapeutic.

B) Intussusception

Case: A 9-month-old child presented with intermittent crying, while crying he pulls up his legs and passes small amount of red mucous per rectum then he is comfortable for few hours followed by another episode of same symptoms. O/E a sausage shaped lump is palpable in upper abdomen with concavity towards umbilicus.



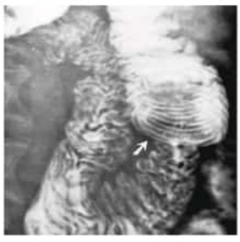
- Peak incidence is between 6 and 9 months, age of weaning (3 months to 2 years).
- Two common causes in children are weaning and lymphoma. For adults- Polyps.
- Frequently occurs infection Adenovirus type 3 virus that causes a reactive lymphoid hyperplasia that act as "lead point" (of Peyer's patch).
- 5% are due to Meckel's diverticulum, polyps, Henoch's Schonlein purpura, hematoma, lymphoma, foreign bodies, and duplications. Commonest site involved is the ileocecal junction.

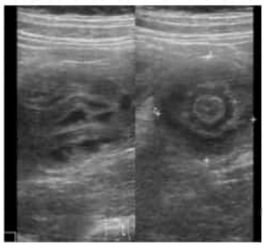
- Three types of intussusception can occur:
  A. Ileoileal
  B. Ileocolic – this is the most common type (mainly seen in children)
  C. Colocolic – This is most common type in adults

Clinical Features:

- Intermittent colicky abdominal pain and vomiting
- Passage of blood - 'red currant jelly' per rectum
- Sausage/ banana shaped abdominal mass with concavity towards umbilicus

- Empty right iliac fossa- Sign de dance

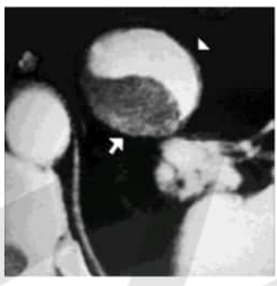


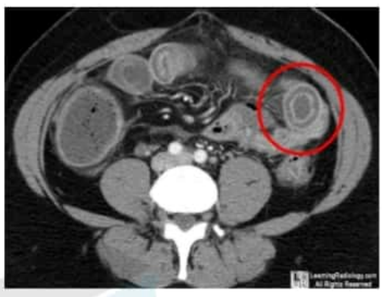


- USG may show **target sign/ Coiled Spring Sign** and Ba enema – **Claw sign.**

CT also shows- Target Sign/Bowel within a Bowel sign.

CECT Abdo- YIN YANG SIGN

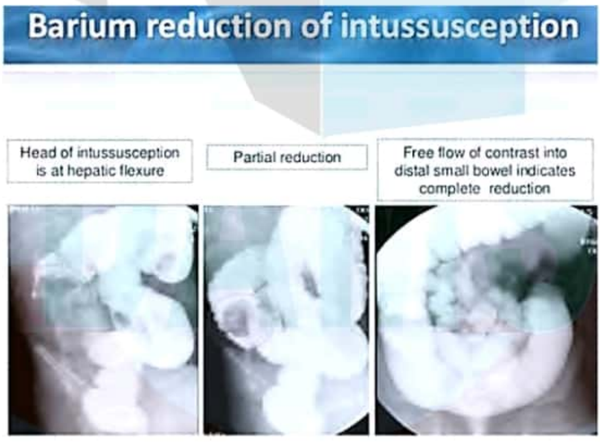




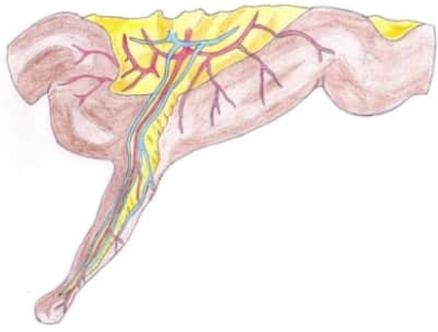
Coiled Spring Sign can also be seen Duodenal Hematoma (Trauma)-Presentation after few days

Treatment

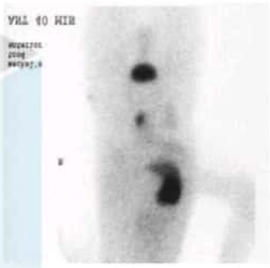
- Attempt reduction with air or contrast enema under radiological guidance (90% success)- Hydrostatic reduction.
- Surgical reduction: The intussusception is reduced by pushing on the distal bowel like a tube of toothpaste rather than pulling the proximal bowel
- If peritonitis, shock or failed reduction requires surgery. Gangrene starts from the tip.
- If bowel necrosis is present then resection with primary anastomosis is done.


Barium reduction of intussusception
Head of intussusception is at hepatic flexure
Partial reduction
Free flow of contrast into distal small bowel indicates complete reduction

C) Meckel's Diverticulum



- It results from the failure of the Proximal end of vitelline duct to obliterate during the fifth week of fetal development.
- It arises from the anti- mesenteric border of the ileum, 50-100cm proximal to the ileocaecal valve.
- It is usually about 2-5 cm in length
- **It has its own blood supply, independent of ileum**
- Ectopic tissue, found in approximately 50 percent of cases of Meckel's diverticulum, is most commonly gastric in origin.



- Bleeding is the most common complication (in children) but obstruction (in adults), intussusception, diverticulitis and perforation may also occur, especially in adults.
- The best Investigation to detect Meckel is technetium-99m pertechnetate scanning. However, the technetium scan depends on uptake by heterotopic gastric mucosa so useful in children.
- Contrast studies is best in adults (for Meckels without ectopic gastric tissue)
- Meckles without ectopic tissue should be treated by divertculectomy and with ectopic tissue should be treated by Resection and Anastomosis

LOWER GI BLEED

Case: A patient presented with chronic blood loss anaemia and positive Guaiac test. Upper and power GI endoscopy are normal. He gives intermittent history of dark stool. Diagnosis?

Approach for lower GI bleed

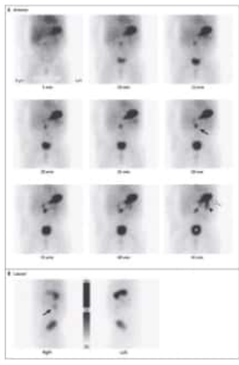
- Proctoscopy : 1st step
  - Followed by
- Upper GI endoscopy (first)> Bowel preparation > Colonoscopy
  If no diagnosis could be made-
- Active bleed- Tc 99 RBC scan > angiography
- Occult bleed- Capsule enteroscopy

- For all unresponsive patient on resuscitation with active continuous bleed, immediate life saving laparotomy should be done.
- Contrast study has very limited role in Lower GI Bleed.

Investigations:

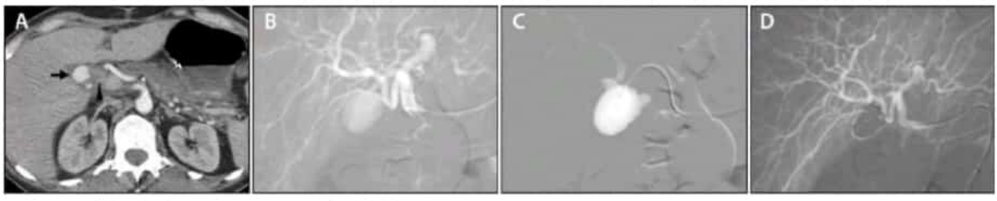
- Colonoscopy
- Radiolabelled scans
- Angiography
- Capsule enterography

- **Radiolabelled scans**
  - Tc99m-labeled RBC scan and the technetium 99m-labeled sulfur colloid scan
  - It can reportedly detect active bleeding at a rate of ***0.10 mL/min.***
  - nuclear scanning can not localize specific site of active bleeding.
  - Scanning is not therapeutic
  - It is a noninvasive study having a sensitivity of 93% and specificity of 95%.



Angiography

- Angiography is only for arterial bleed it does not pick up venous bleeding
- The rate of bleeding should be ***0.5 ml/min - 1 ml/min*** to be detected on angiography
- Angiography has a high incidence of complications such as contrast induced and mechanical complications
- It has a specificity of 100% and sensitivity of around 45%
- It has therapeutic role too

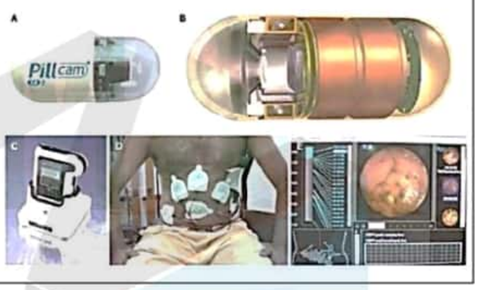


- Hemobilia in Post laparoscopic cholecystectomy.
- A computed axial tomographic scan showing a round mass within the gallbladder fossa with contrast filling at the arterial phase (arrow) and dilatation of the bile duct (arrowhead) (A).

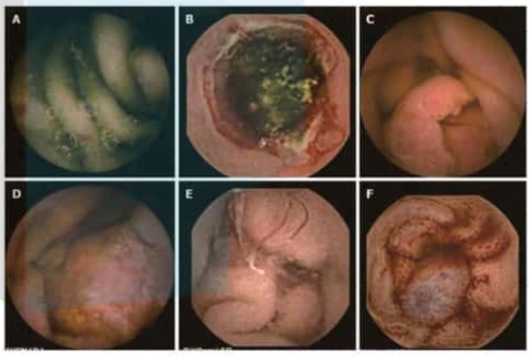
• A selective hepatic arteriogram showing a pseudoaneurysm of the cystic artery stump (B).
• Coil embolization of the aneurysmal sac across the neck (C).
• Control angiography showing complete occlusion of the false aneurysm and preservation of the main and distal hepatic artery (D).

Capsule enteroscopy: is most useful in recurrent small bowel bleed/ occult bleed in stable patient

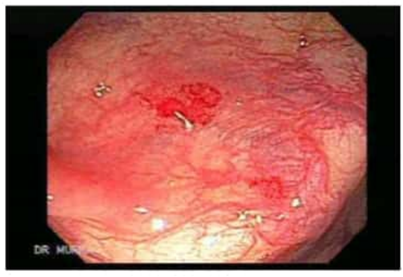
- The most common indications for said procedure are small bowel bleeding (SBB) and pain
- Its is more often done for Occult bleeding Crohn's disease. Other indications are chronic blood loss anaemia, the search for tumors, intestinal polyposis, celiac disease, and abdominal pain.



Capsule endoscopy in patients with obscure gastrointestinal bleed.
A: Arteriovenous malformation;
B: Non-steroidal anti-inflammatory drugs ulcer;
C: Polyp;
D: Adenocarcinoma;
E: Hook worm;
F: Small intestinal varix.



ANGIODYSPLASIA

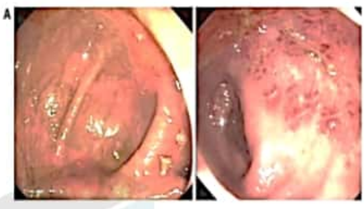


• Angiodysplasia **degenerative disorder** of vascular malformation
• It is second most common cause of colonic bleed (Diverticulosis being first).
• Angiodysplasias occur particularly in the ascending colon and caecumin elderly (MCQ).
• There are dilated tortuous submucosal veins presenting with minor colonic bleed or occult bleed causing anaemia.
• There is an association with aortic stenosis called Heyde's syndrome.

- Von Willebrand's disease caused by ADAMTS13 is also found
- Colonoscopy cauterisation is usually successful.

Rare cause of rectal bleed- solitary rectal ulcer syndrome:

- An ulcerated lesion on anterior wall of rectum presenting with bleeding
- Caused by abnormal contraction of the puborectalis muscle during defecation.
- Internal intussusceptions or prolapsed rectum through puborectalis sling
- Young middle aged patient with anxious personality



Investigations required

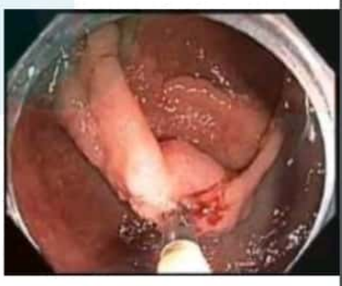
- Sigmoidoscopy (IOC)
- Defecography (Sensitive)
- Biopsy

Histological features:

- Fibromuscular obliteration and **diffuse collagen deposition** of the lamina propria,
- Hypertrophied muscularis mucosa with extension of muscle fibers upwards between the crypts
- Glandular crypt abnormalities (Colitis cystica profunda)

Colon Cancer

Case: A 68-year-old male, during routine check-up was diagnosed with microcytic hypochromic anaemia. O/E a right iliac fossa mass was found. Stool Guaiac test was positive so colonoscopy was planned. Colonoscopy revealed a exophytic growth in cecum and biopsy confirmed adenocarcinoma. For right hemicolectomy which manoeuvre should be done in this patient?



Computerised tomographic scan of the abdomen with contrast in the bowel loops. There is an irregular circumferential soft tissue mass in the cecum with narrowing of the lumen.

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- Most common cancer of GIT and 3rd most common cause of cancer death
- Risk Factors:
  - Diet: Obesity and high fat diet/ smoking & alcohol/ red meat
  - Previous cholecystectomy
  - Radiation
  - IBD
  - Hereditary Syndromes

Hereditary syndromes:

- **FAP**: Chromosome 5q, gene APC, AD, adenomatous Polyp in 2nd decade, cancer by 4th decade (100% risk). (AR- MUTYH-associated polyposis)
- 3 variant of FAP:
  - **Attenuated FAP or AFAP**: polyps less than 100) and age 40s and 50s.
  - **Gardner syndrome**: Other tumors of the skin, soft tissue, and bones (osteoma) and desmoid tumour.
  - **Turcot syndrome**: Brain cancer called medulloblastoma & GBM.
- **Peutz Jegher syndrome**: AD, Chr 19, gene- STK11/LKB1, Hamartomatous polyp
- **Cowden syndrome**: AD, Chr 10, gene PTEN, Hamartomatous polyp
- **Muir Torre syndrome**: Breast & skin tumours (Sebaceous adenoma)
- **HNPCC**: LYNCH I & II, Genes- MSH2 & MLH1 (90%). Other cancers like ovary, uterus (2nd most common), stomach, small intestine, pancreas, TCC of upperurinary tract, CNS (like Turcot) and skin (like Muir Torre).

- Presentation: Commonest site: Rectum> sigmoid> cecum (left sided cancer > Right)

- Right sided cancer: RIF lump (Tumour is exophytic), and occult bleeding in stool presenting as anaemia (Guaiac test positive).
- Left sided cancer: Altered bowel habit, progressing constipation> chronic obstruction
  Rectal cancer: Bleeding per rectum
- Cancer at rectosigmoid junction: Alternating diarrhoea and constipation
- Colon villous adenoma may present as Mckittrick Wheelock syndrome

- Investigations:
  - Colonoscopy: complete because of possibility of synchronous tumour- (5%)
  - Virtual Colonoscopy
  - PET CT for Staging
  - CEA
  - Barium Enema

Virtual colonoscopy: 3D CT with air in colon, any lesion of >6mm can be seen

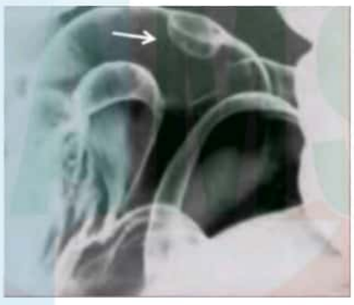
Barium Enema: Apple Core deformity

APPLE CORE SIGN

- The differential diagnosis of a lesion with an apple core appearance is

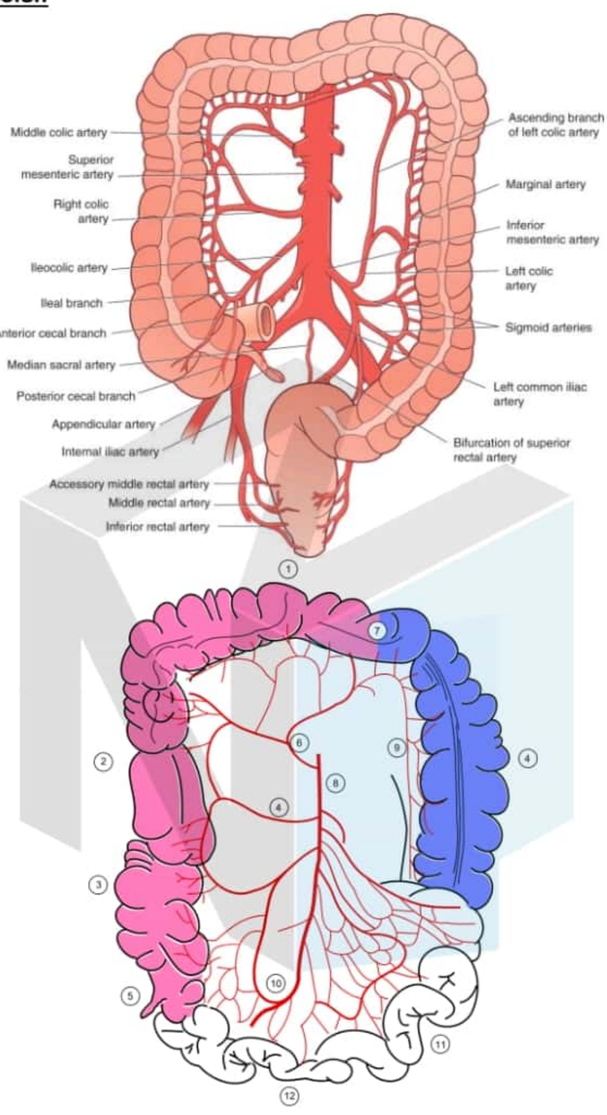
1. Focal diverticulitis
2. Ischemic colitis
3. Ulcerative colitis
4. Endometriosis
5. Amebiasis
6. Serosal metastatic implants
7. Infectious colitis

Barium Enema: Bowler Hat Sign – Seen in Sessile colonic polyps and diverticula



Mexican Hat sign: Pedunculated polyp of colon

Blood Supply of Colon



Colonic blood supply. 1 - :transverse colon, 2 - ascending colon, 3 - caecum, 4 - right colic artery, 5 - appendix, 6 - middle colic artery, 7 - **Cannon-Böhm point** (the border between the areas of SMA and IMA supplies) , 8 - superior mesenteric artery, 9 - **marginal artery of Drummond**, 10 - ileocolic artery, 11 - jejunum (partial), 12 - ileum (partial). Proximal small intestine, abdominal organs (pancreas, liver etc), sigmoid and rectum, aorta and inferior mesenteric artery are not shown. Pink - supply from superior mesenteric artery (SMA) and its branches: middle colic, right colic, ileocolic arteries. Blue - supply from inferior mesenteric artery (IMA) and its branches: left colic, sigmoid, superior rectal artery.

- The **Griffiths point**, also known as **Griffiths critical point**, refers to the site of watershed anastomosis between the ascending left colic artery and the marginal artery of Drummond occurring in the region of the splenic flexure. Most anatomy texts describe the location as two-thirds along the transverse colon.
  This represents an important collateral communication between the superior mesenteric and inferior mesenteric arteries upon which the splenic flexure and descending colon may be dependent.

- The Sudeck point (or Sudeck critical point) refers to a specific location in the arterial supply of the rectosigmoid junction, namely the origin of the last sigmoid arterial branch from the inferior mesenteric artery (IMA). This arterial branch usually forms an anastomosis between the superior rectal artery (br of IMA) and the Middle Rectal Artery (Br of Internal iliac artery).

Lymphatic drainage of Colon

- Ascending and transverse colon- Superior mesenteric LN
- Descending colon, sigmoid colon and upper 1/3rd of Rectum- Mesenteric LN
- Lower 2/3rd of the rectum- Internal and external Iliac LNs.

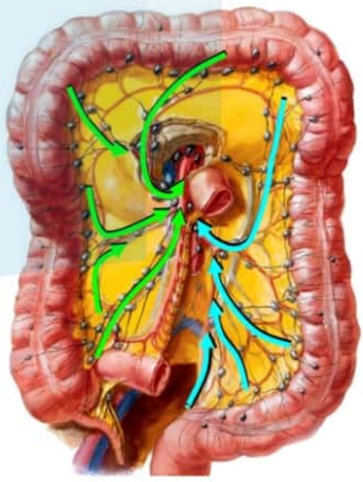
Lymphatic drainage:

General pattern parallels the arterial supply

SMA distribution to ***superior mesenteric lymph nodes***, cisternal chyli, thoracic duct
MIDGUT PATTERN

IMA distribution to ***inferior mesenteric lymph nodes***, cisternal chyli, thoracic duct
HINDGUT PATTERN

Shared drainage near left colic flexure

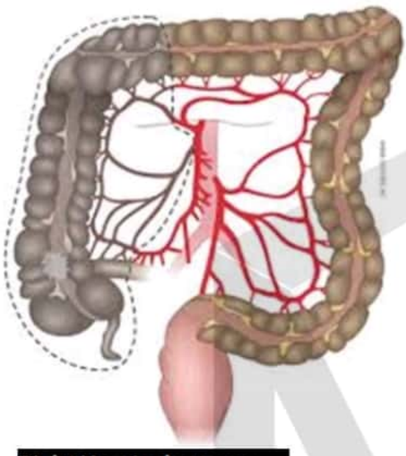


Treatment for Colon Cancer

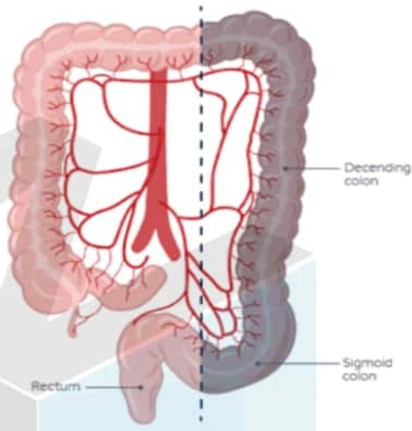
• Chemotherapy: given as neoadjuvant and adjuvant both (Duke's stage >B)
A. FOLFOX (Folinic acid, 5FU and oxaliplatin)
B. FOLFIRI (Folinic acid, 5FU and Irinotecan)
C. FOLFIRINOX (Folinic acid, 5FU, Irinotecan and oxaliplatin)

D. Gemox (Gemcetabine and oxalilatin)
• Radiotherapy: Only as neoadjuvant along with Chemotherapy

Surgery:
1. Right hemicolectomy: Cancer from IC junction to hepatic flexure
2. Right extended hemicolectomy: From hepatic flexure to right 2/3rd of transverse colon
3. Left hemicolectomy: Cancer beyond splenic flexure

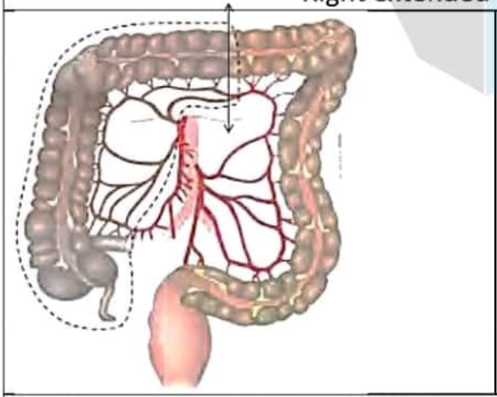


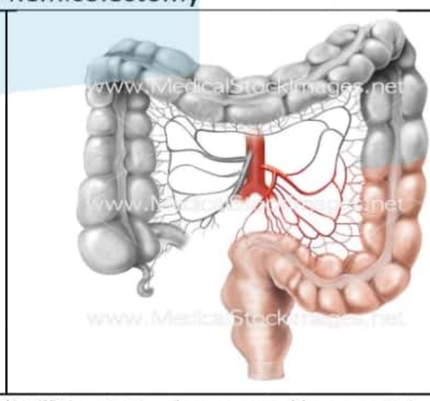
Right Hemicolectomy



LEFT HEMICOLECTOMY

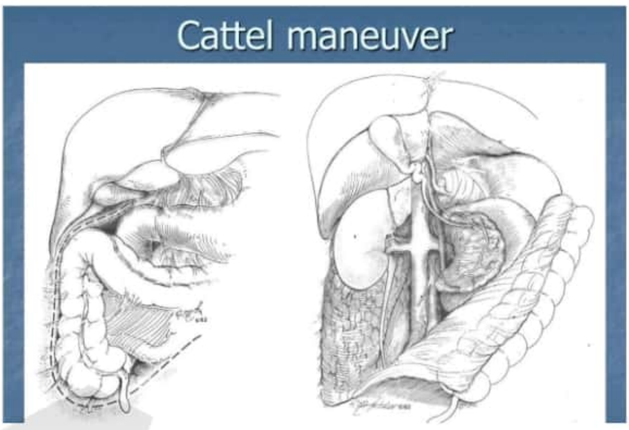
Right extended hemicolectomy



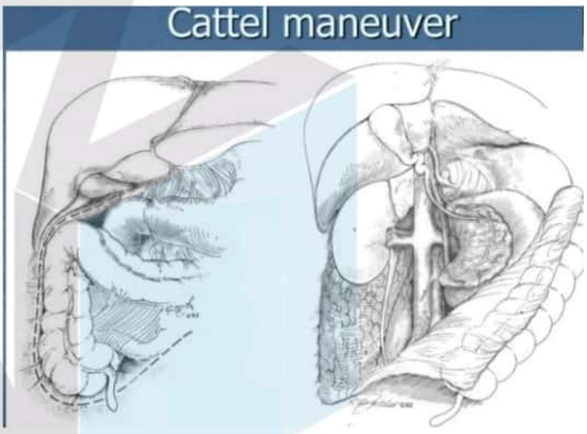


In right extended hemicolectomy Splenic flexure (Griffith point is also removed because it is a ischemic area)

- **Mobilization of Right colon (Right medial visceral rotation) CATTLE MANEUVER**

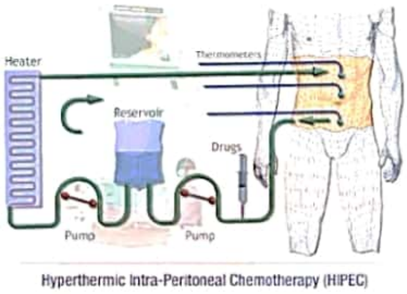


- **Mobilization of left colon (Left medial visceral rotation) MATTOX MANEUVER**



CRS with HIPEC: cytoreductive surgery (CRS) and intraoperative hyperthermic intraperitoneal chemotherapy (HIPEC)

- It is new treatment modality for primary or secondary malignancies of the peritoneum (e.g. Mesothelioma, colorectal cancer, appendix neoplasms, pseudomyxoma peritonei, ovarian cancer).
- After a debulking surgery CT is given in intraperitoneal space at higher temperature (420 C) for 4- 8 hours to take care of peritoneal secondaries



Hyperthermic Intra-Peritoneal Chemotherapy (HIPEC)

Intestinal Obstruction & Ileus

Case: A 70 years old male presented in emergency with Grossly distended abdomen, mild pain, not able to pass flatus of faeces and nausea. On examination whole abdomen was distended and tympanic on percussion without any feature of peritonitis. Patient was hemodynamically stable. X ray picture is given below. What should be the immediate next step in this patient?

Xray: Coffee Bean Sign
Dx: Sigmoid Volvulus

Obstruction

- Acute intestinal obstruction:
  - SI obstruction
  - M/C cause- Post operative adhesion > Hernia > volvulus > IBD
- Sub acute intestinal obstruction
  - SI obstruction
  - M/C cause- Post operative adhesion
- Chronic intestinal obstruction
  - Colonic obstruction
  - M/C cause - Cancer

Investigations:

•Acute intestinal obstruction → X ray abdomen – Supine > Erect
•Subacute and Chronic obstruction → CECT > Thin contrast study

Multiple Air Fluid levels

Step ladder pattern

in Erect XRay

In Erect Xray:
Distended Bowel Loop

Diameter :
>3 cm in the Small intestine

>6cm in the colon

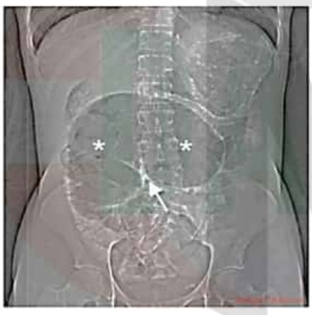
>9cm in the caecum

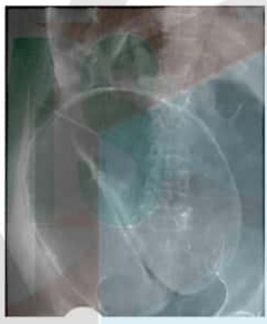
suggests obstruction

Stack of Coins sign

seen in small bowel Hematoma

Sigmoid Volvulus
Omega Sign/ Coffee Bean shaped shadow





Bird Beak sign (Sigmoid volulus)

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Northern Star Sign: Sigmoid Volvulus (The apex of the sigmoid volvulus is seen cranial to the transverse colon)

Post operative Ileus (Lasting for > 3-5 days)
- Most commonly involved part of GIT: Small Intestine
- Recovery-
  - SI - <24 Hrs (First to recover)
  - Stomach- < 48 Hrs
  - Colon- 3-5 days (Sigmoid is last to recover)
- DOC for Ileus- Neostigmine
- New drug approved for Opioid induced Ileus
- **Methylnaltrexone & alvimopan**: Inhibit peripheral mu-opioid receptors. Do not cross blood brain barrier

Treatment for Gastroparesis

1. **Dietary Modification-** It is the first line therapy. Foods that are fatty, acidic, spicy and roughage-based are avoided.
2. **Hydration & Nutrition-** Recurrent vomiting & reduced oral intake may result in hypokalaemia, metabolic alkalosis and dehydration. Hydration and vitamin supplementation should be provided to all patients either orally, enterally, or parenteral.
3. **Optimize Glycaemic control-** Diabetes mellitus is a common cause of delayed gastric emptying. Hence glycaemic control is essential. In patients with diabetes, therapies such as PRAMLINTIDE (Amylin Analog) and GLP1 Analogues (LIRAGLUTIDE, EXENATIDE) should be avoided as they can delay gastric emptying. In contrast, DPP IV inhibitors (VILDAGLIPTIDE, SITAGLIPTIDE) do not affect gastric emptying.
4. **Prokinetic Therapy (↑ Peristalsis)-**
   - Prokinetic therapy is necessary for patients who continue to have symptoms despite dietary modifications.

- Prokinetics should be administered 10 to 15 minutes before meals.
- As compared with tablets, liquid formulations allow for easier dose titration and are less likely to accumulate in the stomach and cause erratic absorption.
- METACLOPRAMIDE is the first line therapy for GASTROPARESIS
  i. It is a D2 Receptor Antagonist, a 5-HT4 agonist and a weak 5-HT4 Receptor Antagonist. Also, it does cross BBB.
  ii. It improves gastric emptying by enhancing gastric **antral contractions** and **decreasing postprandial fundus relaxation**
  iii. Important side effects are **extrapyramidal symptoms-** like Dystonia, and tardive dyskinesia, hyperprolactinemia, and QT prolongation
  iv. In patients whose symptoms fail to respond to METOCLOPRAMIDE or have side effects, DOMPERIDONE can be given as alternative.
- ERYTHROMYCIN- it is a motilin receptor agonist, induces gastric contractions that increase gastric emptying. It also stimulates fundic contractility.
  i. It is given to patients who fail to respond to initial drugs.
  ii. Should not be administered longer than four weeks due to risk of TACHYPHYLAXIS.
  iii. S/E are QT Prolongation, and sudden death, particularly when used in patients taking medications that inhibit CYP3A4.
- CISAPRIDE- is a 5-HT4 agonist, that stimulates antral and duodenal motility.
  i. Associated with many important drug interactions with medications metabolized by Cytochrome P450-3A4 isozyme (E.g. macrolides, Antifungals) resulting in Cardiac arrythmias, and death.
  ii. MOSAPRIDE & ITOPRIDE are still comparatively safer.

Drugs which can delay gastric emptying

1. Opioids
2. Alpha-2-adrenergic agonists (eg, clonidine).
3. Tricyclic antidepressants .
4. Calcium channel blockers.
5. Dopamine agonists.
6. Muscarinic cholinergic receptor antagonists.
7. Octreotide
8. Glucagon-like peptide (GLP)-1 agonists (eg, exenatide)
9. Phenothiazines
10. Cyclosporine

Ogilvie's syndrome
(acute colonic pseudo-obstruction)

- Intense dilatation starting from caecum and right colon may extend up to the rectum, in the absence of a mechanical obstructive cause.
- Most patients have underlying condition like trauma, infection or cardiac diseases.
- Generally there is parasympathetic suppression and sympathetic overtone
- Clinical manifestations excessive abdominal distention with mild pain and obstruction.
- Eventually colonic distention will lead to ischemia and perforation.
- CT is IOC.
- Conservative treatment is TOC. Neostigmine is DOC. Colonic decompression may be needed by colonoscopy or cecostomy
- Caecal diameter of12 cm or more suggest imminent perforation mandating immediate laparotomy/ decompression.

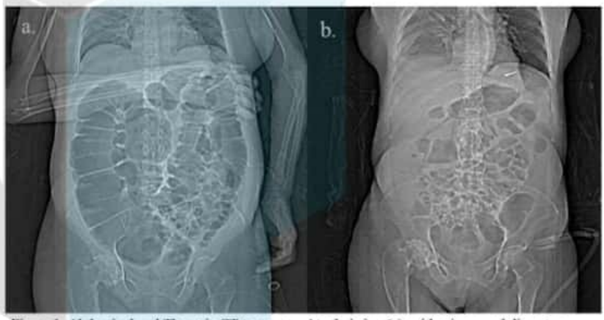
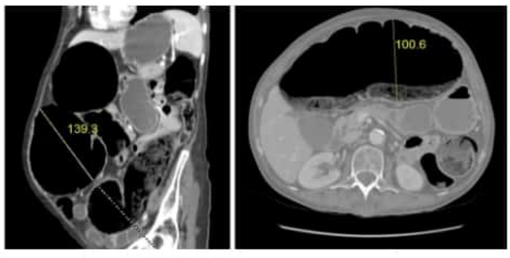
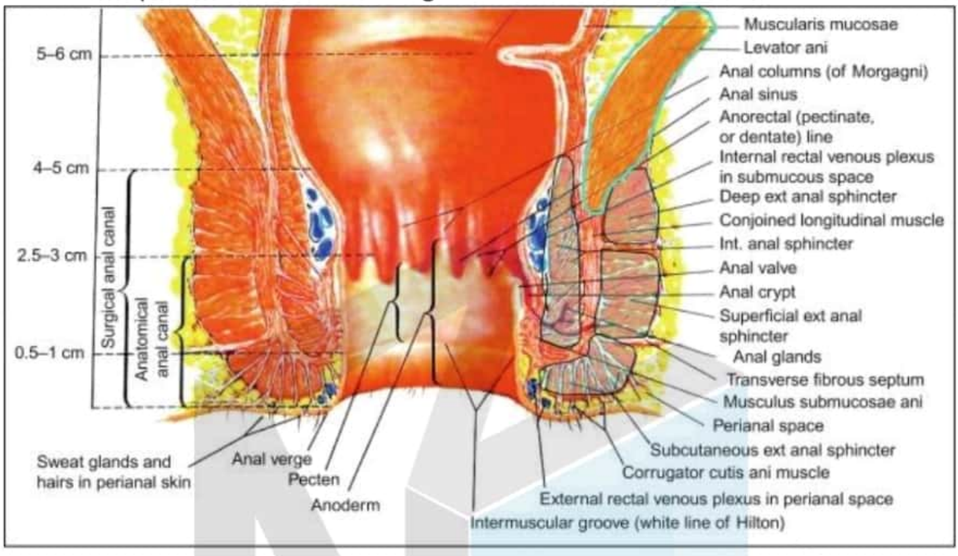


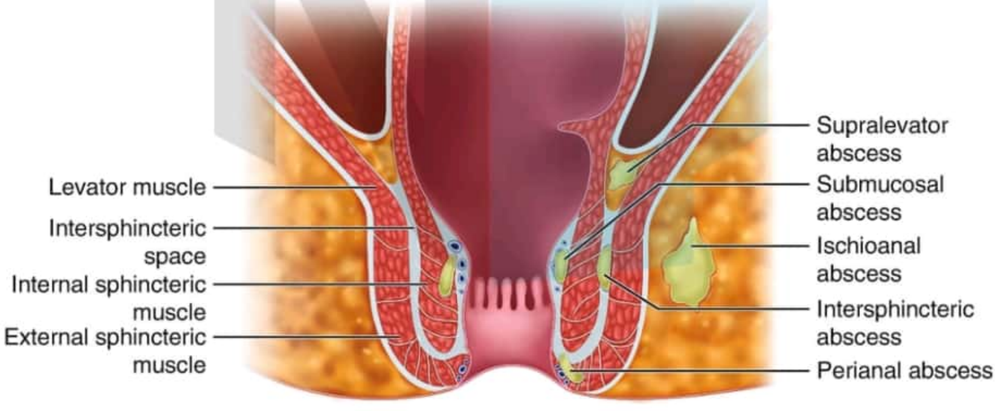
Figure 1. Abdominal and Thoracic CT topogram. At admission (a), with a increased diameter caecum and right colon, without evidence of left colon enlargement; (b) after decompressive colonoscopy, demonstrating regression of colonic dilation.



Peri-Anal Diseases

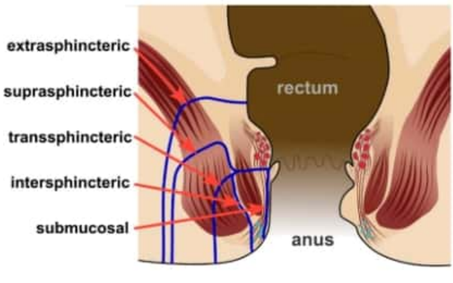
Case: A 45-year-old male presented with intermittent discharge from a small peri-anal opening. Diagnosis of fistula in ano was made and Proctoscopy revealed a internal opening at 6'o clock position 2 cm from anal verge.





Park's Classification – for Abscess and fistula in ano

1. Intra-sphincteric fistula- Most Common
2. Trans-Sphincteric fistula- 2nd Most Common
3. Supra-sphincteric
4. Extra-sphincteric

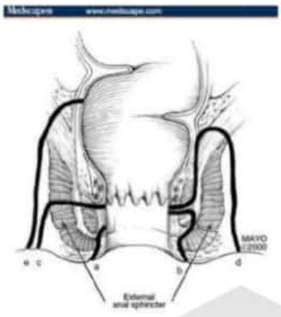


CLASSIFICATION (contin.)

Based on level of internal opening related to anal sphincters

- Low variety
- High variety

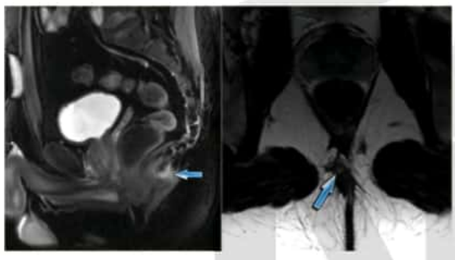
  If the internal opening begins *above* the anal sphincter then the fistula is described as 'high'.
  Usually rare.

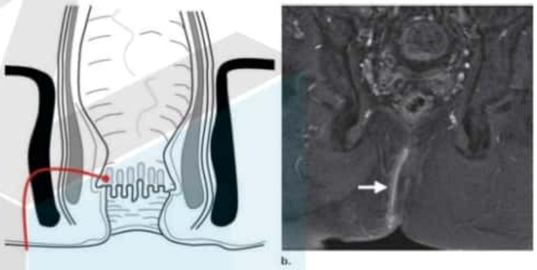


For management of Low Type fistulas, sphincterotomy is not required, and can be treated externally only.

But for High variety of anal fistulas, sphincterotomy is required and the patient might even become incontinent after the procedure. Therefore, other procedures are employed.

IOC for fistulas- MRI (with fistulogram)
(Non-contrast)

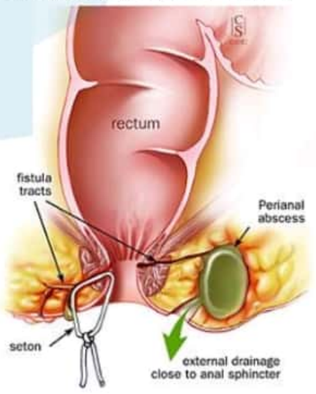




Grade 3: transsphincteric fistula (same patient as in Fig 12). **(a) Coronal drawing of the anal canal shows the right transsphincteric fistula. (b) Coronal contrast-enhanced fat-suppressed T1-weighted MR image shows the highly enhancing transsphincteric fistula (arrow) from the dentat line to the skin, passing through the ischioanal fossa and piercing the external sphincter**

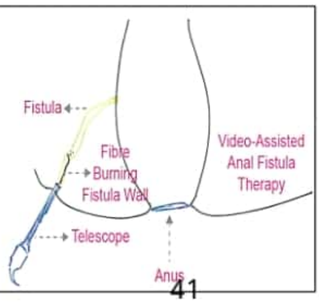
Treatment:

- Conventional treatment:
  - Low type: Fistulotomy
  - High type: Seton Wiring
- Newer treatments:
  - VAAFT
  - LIFT
  - FiLac



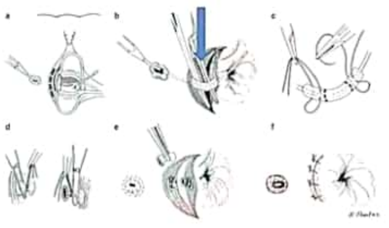
VAAFT (Video Assisted Anal Fistula treatment)

- Fistula is localized and ligated under diagnostic fistuloscopy



LIFT (Ligation of the intersphincteric fistula tract)

- It is for trans-sphincteric fistula
- A Intersphincteric tract is identified and ligated and divided close to the internal sphincter through trans-sphincteric space.



FiLaC (Fistula-tract Laser Closure)

- Radial emitting Diode Laser probe is passed in fistulous tract and tract is destroyed along with granulation and epithelial tissue.